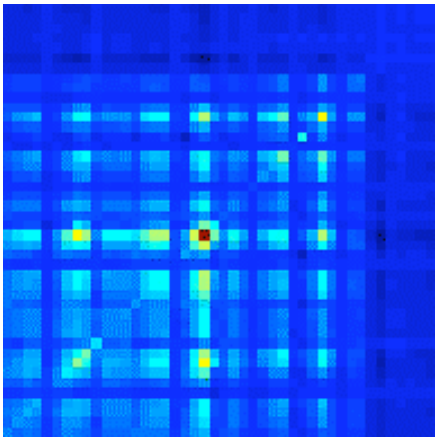
Multifactor Risk Modeling

Synterein works with Upstream Technologies to develop a risk model for international stocks and domestic bonds



Here's a new fact in finance:

> "Multifactor extensions of the CAPM dominate the description, performance, attribution, and explanation of average returns."

So says John H. Cochrane, Sigmund E. Edelstone Professor of Finance in the Graduate School of Business at the University of Chicago[1].

But even though the use of multifactor models has become widespread in risk management, only a small number of providers offer models to the investment management industry. So when Upstream Technologies needed a multifactor model for their Investment Management Sysem (IMS), they engaged Synterein to develop a model appropriate for international stocks and domestic bonds.

Upstream Technologies, founded in July 1999 by principals with broad experience in investment management, trading and technology, applies advanced technologies to automate the active portfolio management process.

Synterein worked with Upstream to develop a returns-based model for international stocks and a duration-based model for domestic bonds. Factors were chosen from among investable portfolios represented by equity and fixed income indexes. For stocks, these indexes corresponded to economic sectors defined by S&P so that consistent factors could be used for markets in the United States, Europe and Asia-Pacific. For bonds, Lehman bond indexes were chosen. Upstream selected Datastream as the market data provider.

Factor exposures for stocks were constrained to be positive for their economic sector as represented by their FTSE Global Classification System classification as mapped to the S&P Global Industry Classification System (GICS) classification. Factor exposures for all other sectors were constrained to be zero. Factor exposures for bonds were determined so that the linear combination of index durations equaled the bond duration.

Synterein developed a processing framework to accept pricing data from Datastream as text, compute returns for stocks, and durations for bonds using the Black-Derman-Toy model[2]. Adjustments were made to all factor exposures to revert to the mean for stocks and to account for credit ratings for bonds. In order to handle stocks for which insufficient pricing history was available, an average exposure was used.

The resulting model, developed at half-time effort over six months, was incorporated into the Upstream IMS, which is currently used by major money managers. Given the relatively short time for development, apparently another new fact in finance is this: if you need a multifactor model, develop one.

Indexes Selected as Factors

Ticker	United States	Ticker	Europe	Ticker	Asia Pacific
SP5EENE	S&P500 ES ENERGY	SPE3E1$	S&P EUROPE 350 ENERGY $	SPASPE1	S&P ASIA PAC 100 ENERGY
SP5EMAT	S&P500 ES MATERIALS	SPE3M1$	S&P EUROPE 350 MATERIALS $	SPASPM1	S&P ASIA PAC 100 MATERIALS
SP5EIND	S&P500 ES INDUSTRIALS	SPE3ID$	S&P EUROPE 350 INDUSTRIALS $	SPASPID	S&P ASIA PAC 100 INDUSTRIALS
SP5ECOD	S&P500 ES CONSUMER DISCRETIONARY	SPE3CD$	S&P EUROPE 350 CONS. DISCRETNRY $	SPASPCD	S&P ASIA PAC 100 CONS. DISCRETNRY
SP5ECST	S&P500 ES CONSUMER STAPLES	SPE3CS$	S&P EUROPE 350 CONS. STAPLES $	SPASPCS	S&P ASIA PAC 100 CONS. STAPLES
SP5EHCR	S&P500 ES HEALTH CARE	SPE3HC$	S&P EUROPE 350 HEALTH CARE $	SPASPHC	S&P ASIA PAC 100 HEALTH CARE
SP5EFIN	S&P500 ES FINANCIALS	SPE3FN$	S&P EUROPE 350 FINANCIALS $	SPASPFN	S&P ASIA PAC 100 FINANCIALS
SP5EINT	S&P500 ES INFO TECHNOLOGY	SPE3IT$	S&P EUROPE 350 INFO. TECH. $	SPASPIT	S&P ASIA PAC 100 INFO. TECH.
SP5ETEL	S&P500 ES TELECOM SERVICES	SPE3T1$	S&P EUROPE 350 TELECOM. SVS. $	SPASPT1	S&P ASIA PAC 100 TELECOM. SVS.
SP5EUTL	S&P500 ES UTILITIES	SPE3U1$	S&P EUROPE 350 UTILITIES $	SPASPU1	S&P ASIA PAC 100 UTILITIES
S&PMIDC	S&P 400 MIDCAP	FTEMIDI	FTSE EURO MID	TSEM400	TOKYO SE TOPIX MID 400
SP6GROW	S&P SC 600 BARRA GROWTH	FTSESCO	FTSE SMALL CAP	TSESCOS	TOKYO SE TOPIX SMALL
SP6VALU	S&P SC 600 BARRA VALUE				

[1] Cochrane, J. H., 1999, New facts in finance, *Economic Perspectives* 23 (3), 36–58.

[2] Black, F., E. Derman, and W. Toy, 1990, A one-factor model of interest rates and its application to treasury bond options, *Financial Analysts Journal* 46 (1), 33-39.